The RCET System: Infrastructure to Facilitate Advanced Technology Radiotherapy Trials

Attendees at Cancer Imaging Informatics Workshop:

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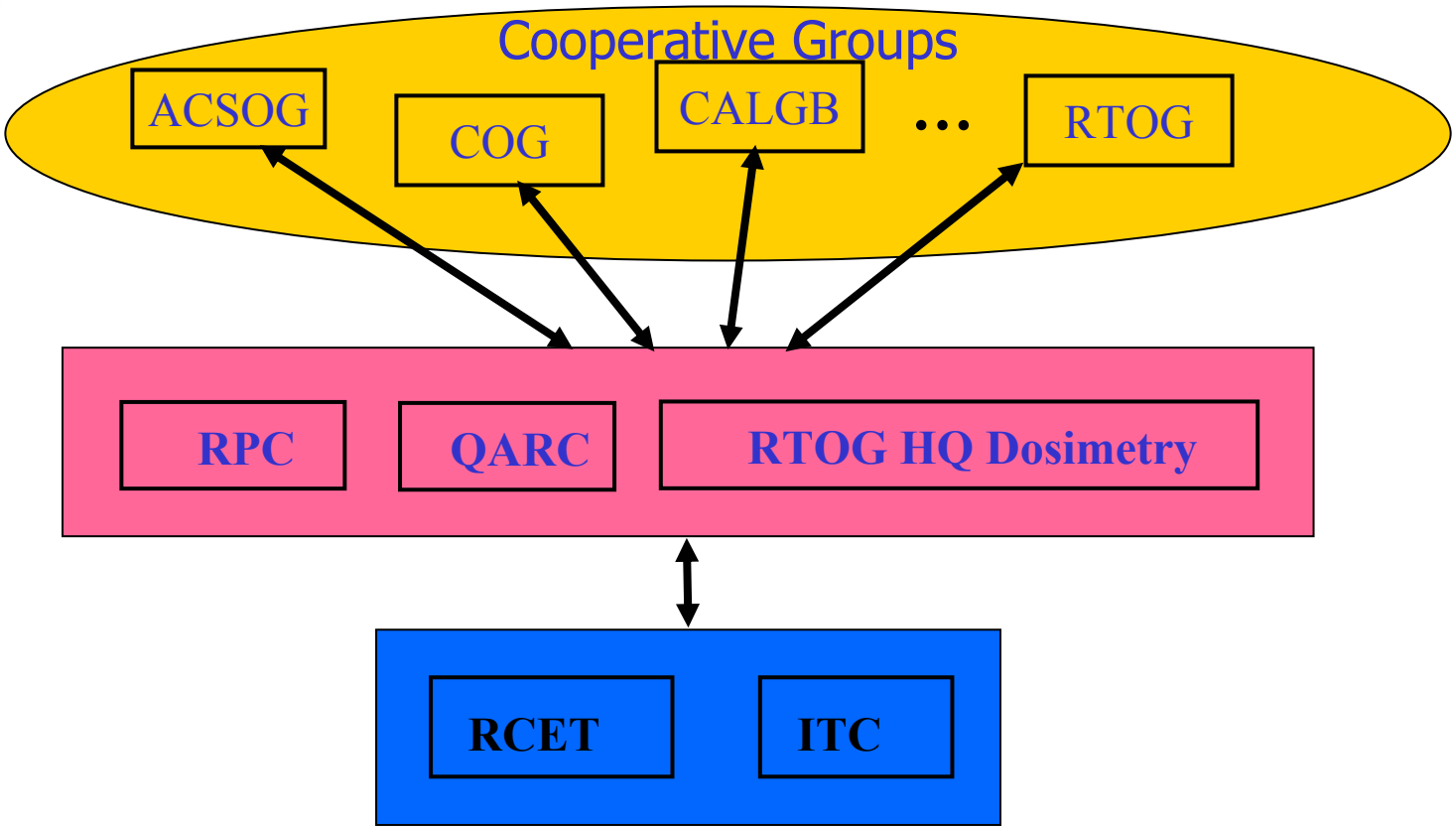
  - Principal Investigator
- Vincent A. Frouhar, Ph.D.
  - Lead Development Physicist
- Sanjay Ranka, Ph.D.
  - Computer Scientist

Advanced Technology QA Consortium (ATC)



ITC and RCET will provide a digital data exchange mechanism for existing QA Centers that serve various cooperative groups.

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RCET Mission Statement

- The mission of the Resource Center for Emerging Technologies (RCET) at the University of Florida is to provide the advanced technical resources necessary to improve radiotherapy patient outcomes. It will provide an advanced medical informatics infrastructure that will facilitate education, collaboration, and peer review, as well as provide an environment in which clinical investigators can receive, share, and analyze voluminous multimodality clinical data. The confluence of these endeavors will lead to improved patient care.

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The RCET System

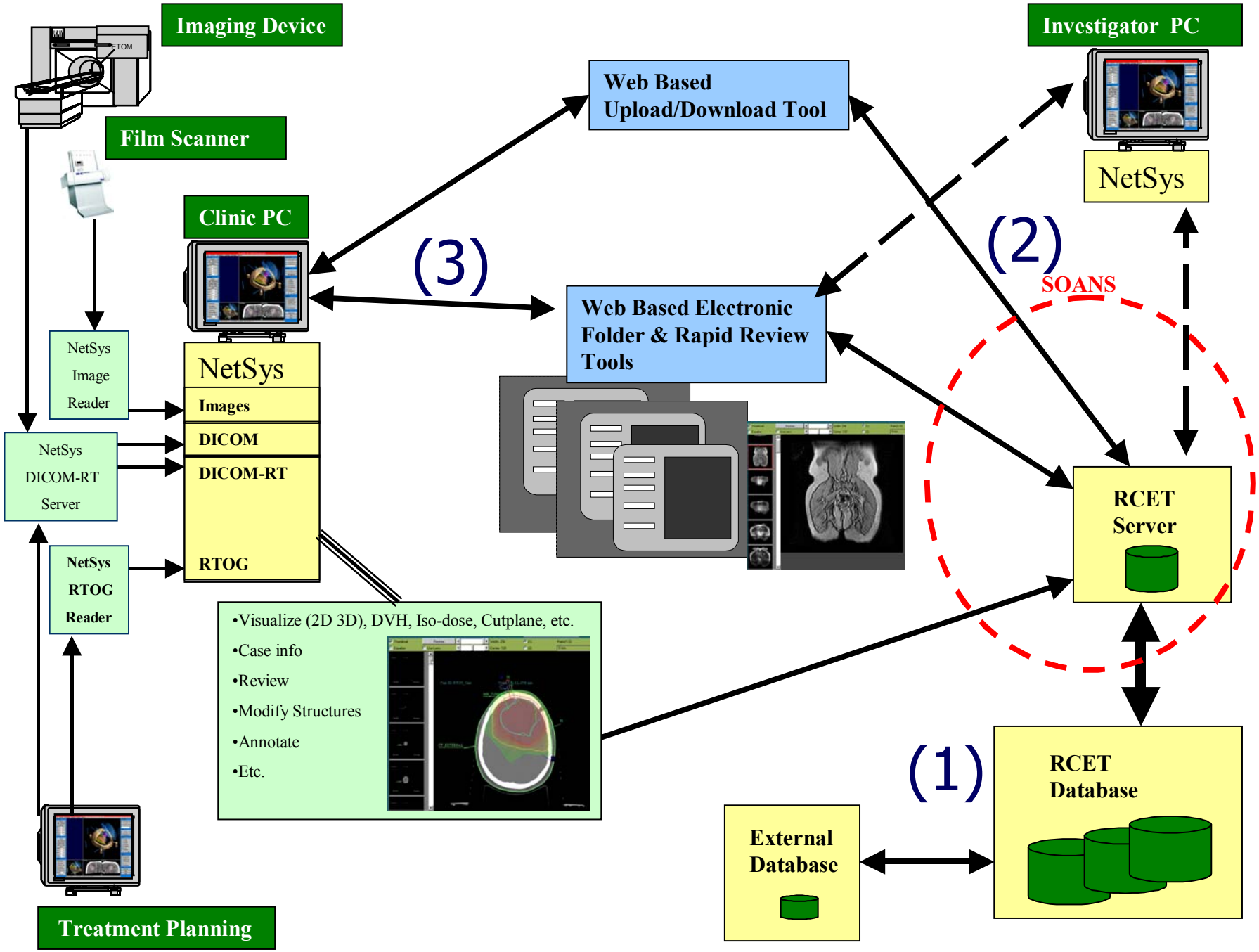
- It is an integrated system to facilitate the preparation, submission, archiving, and review of radiotherapy and diagnostic imaging data
- It is designed to accommodate the proliferation of data by distributing processing tasks and automation
- It employs the latest medical informatics technology; consisting of 1.1 million lines computer code in 8 programming languages

RCET Infrastructure

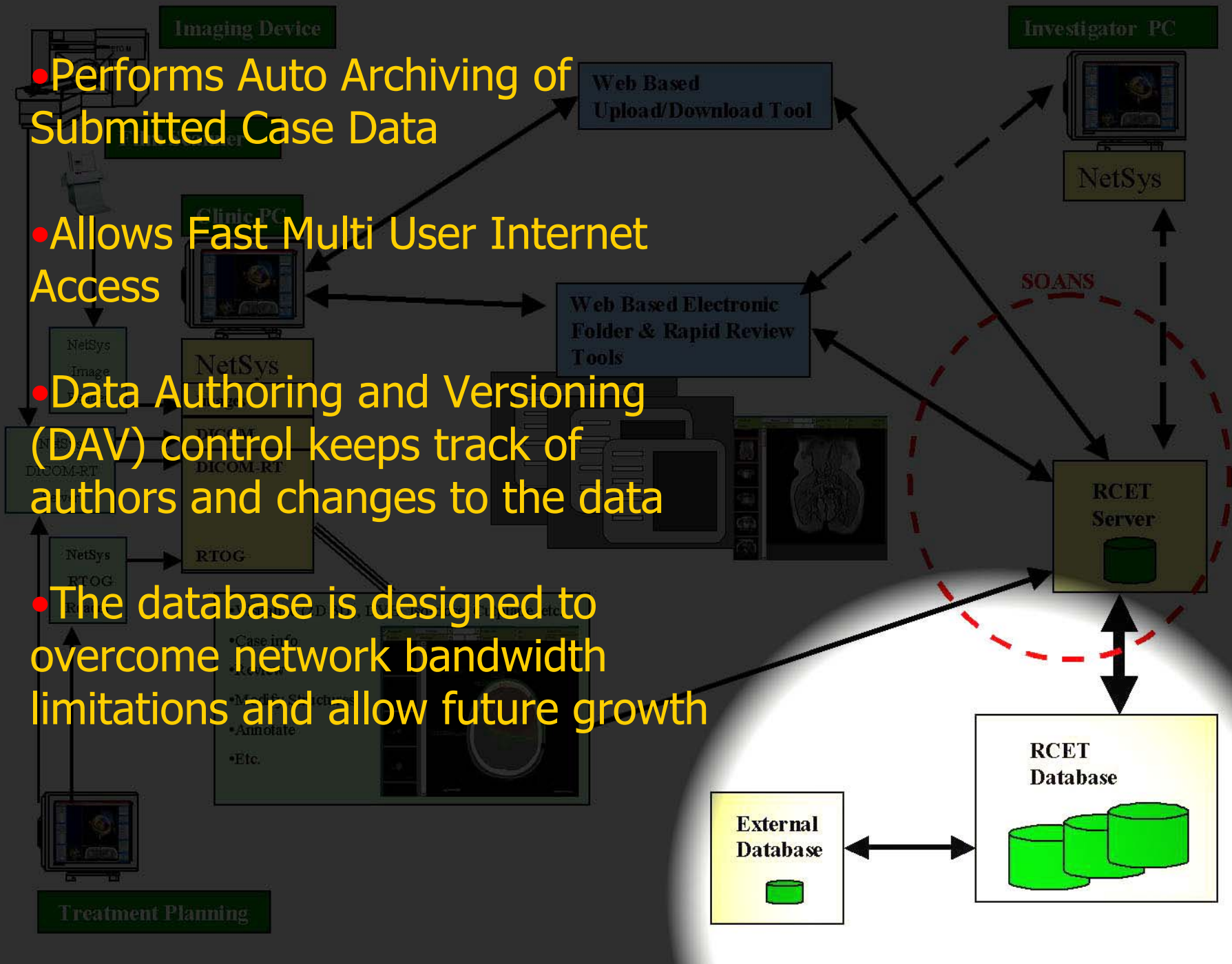
- Data Structure and Organization
  - Comprehensive Indexing of Archived Data Objects
  - Integration of Radiotherapy, Diagnostic, and Textual Data
- Data Accessibility
  - Multi Access Across a Wide Area Network
  - Open Architecture Object Server for Getting Data In/Out
- Automation and Distribution of Tasks
  - Data Registered without RCET Staff Interaction
  - Remote Clients Are Employed to Process Data
- Security and Anonymization
  - Known Data Formats are Anonymized
  - All Data Transfers are Encrypted (SHTTP)
  - Web Based Applications Embed Data in the Client Application and Suppress HTTP command echoes
- Functionality
  - Simple Data Transfer: Secure Anonymous FTP replacement
  - Complex Data Preparation
  - Rapid Web Based Review
  - Data Mining via Object Server

The RCET System consists of three central components

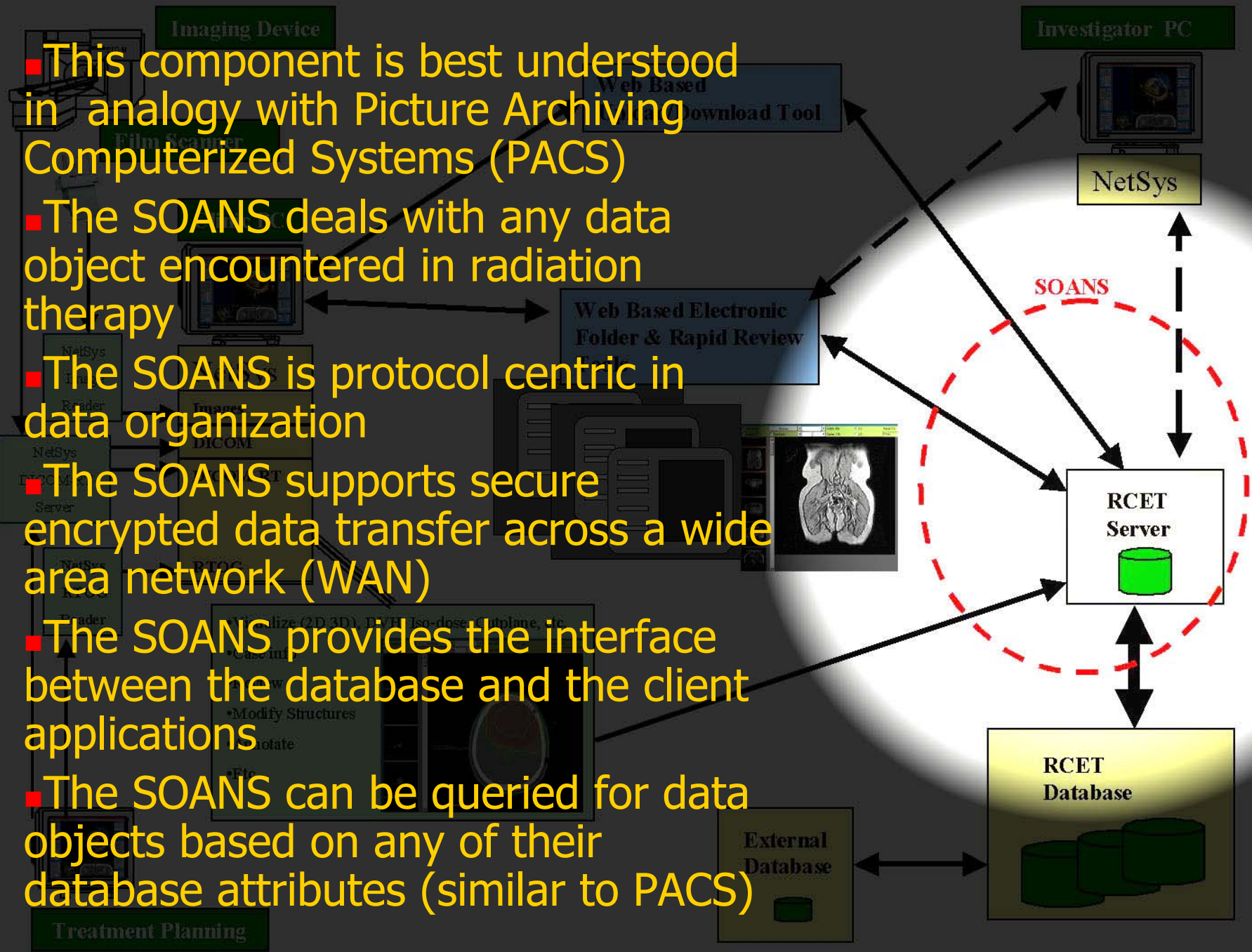
- a centralized auto archiving database
- a web based secure object archiving network system or **SOANS**
- a suite of user friendly pc and web client applications for clinical data preparation, submission, and review or **NetSys**

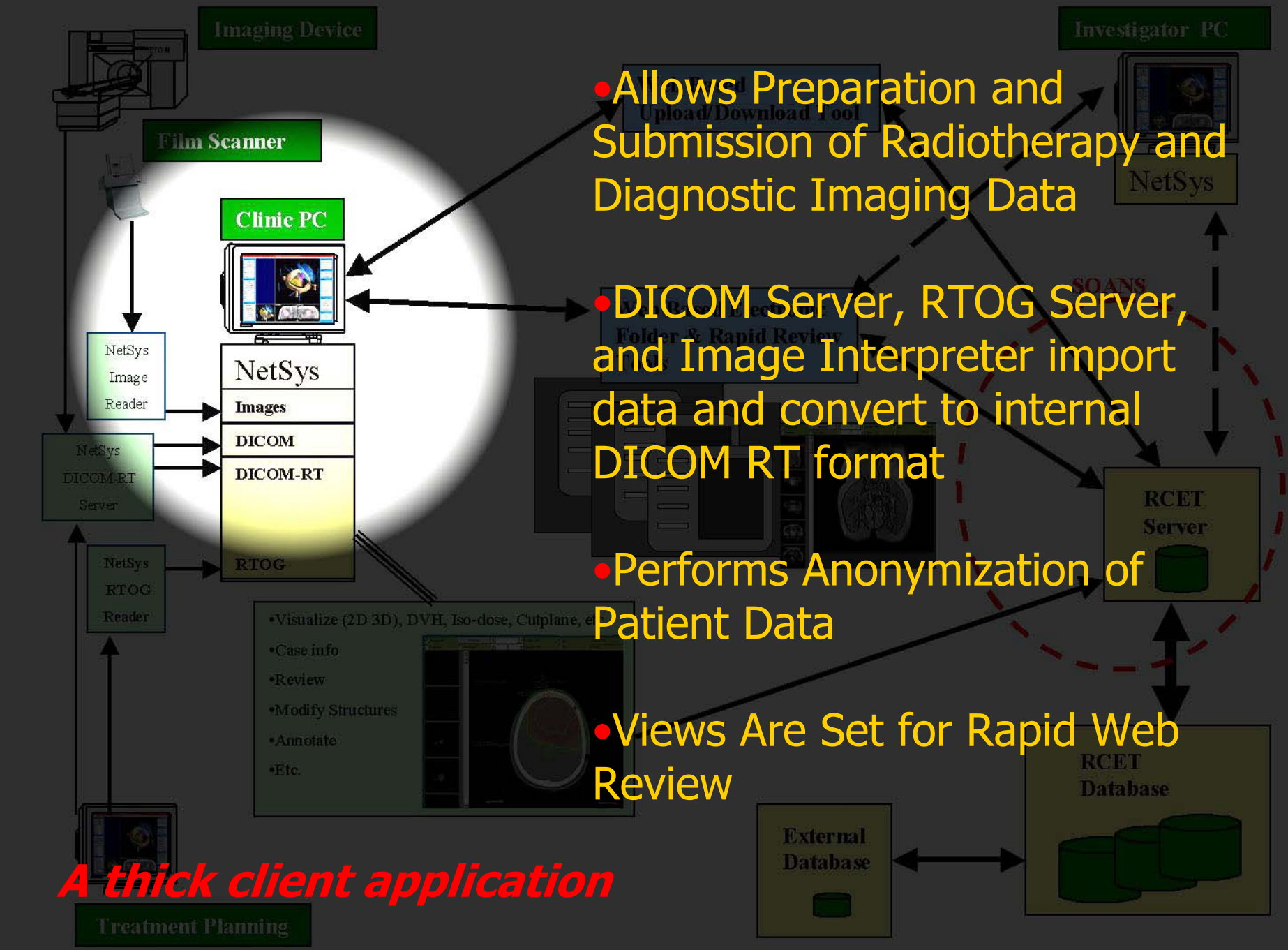

Imaging Device
Film Scanner
Clinic PC
Web Based Upload/Download Tool
Investigator PC
NetSys
(2)
SOANS
(3)
Web Based Electronic Folder & Rapid Review Tools
NetSys Image Reader
NetSys DICOM-RT Server
NetSys RTOG Reader
NetSys
Images
DICOM
DICOM-RT
RTOG
RCET Server
•Visualize (2D 3D), DVH, Iso-dose, Cutplane, etc.
•Case info
•Review
•Modify Structures
•Annotate
•Etc.
(1)
RCET Database
External Database
Treatment Planning

- Performs Auto Archiving of Submitted Case Data
- Allows Fast Multi User Internet Access
- Data Authoring and Versioning (DAV) control keeps track of authors and changes to the data
- The database is designed to overcome network bandwidth limitations and allow future growth



- This component is best understood in analogy with Picture Archiving Computerized Systems (PACS)
- The SOANS deals with any data object encountered in radiation therapy
- The SOANS is protocol centric in data organization
- The SOANS supports secure encrypted data transfer across a wide area network (WAN)
- The SOANS provides the interface between the database and the client applications
- The SOANS can be queried for data objects based on any of their database attributes (similar to PACS)

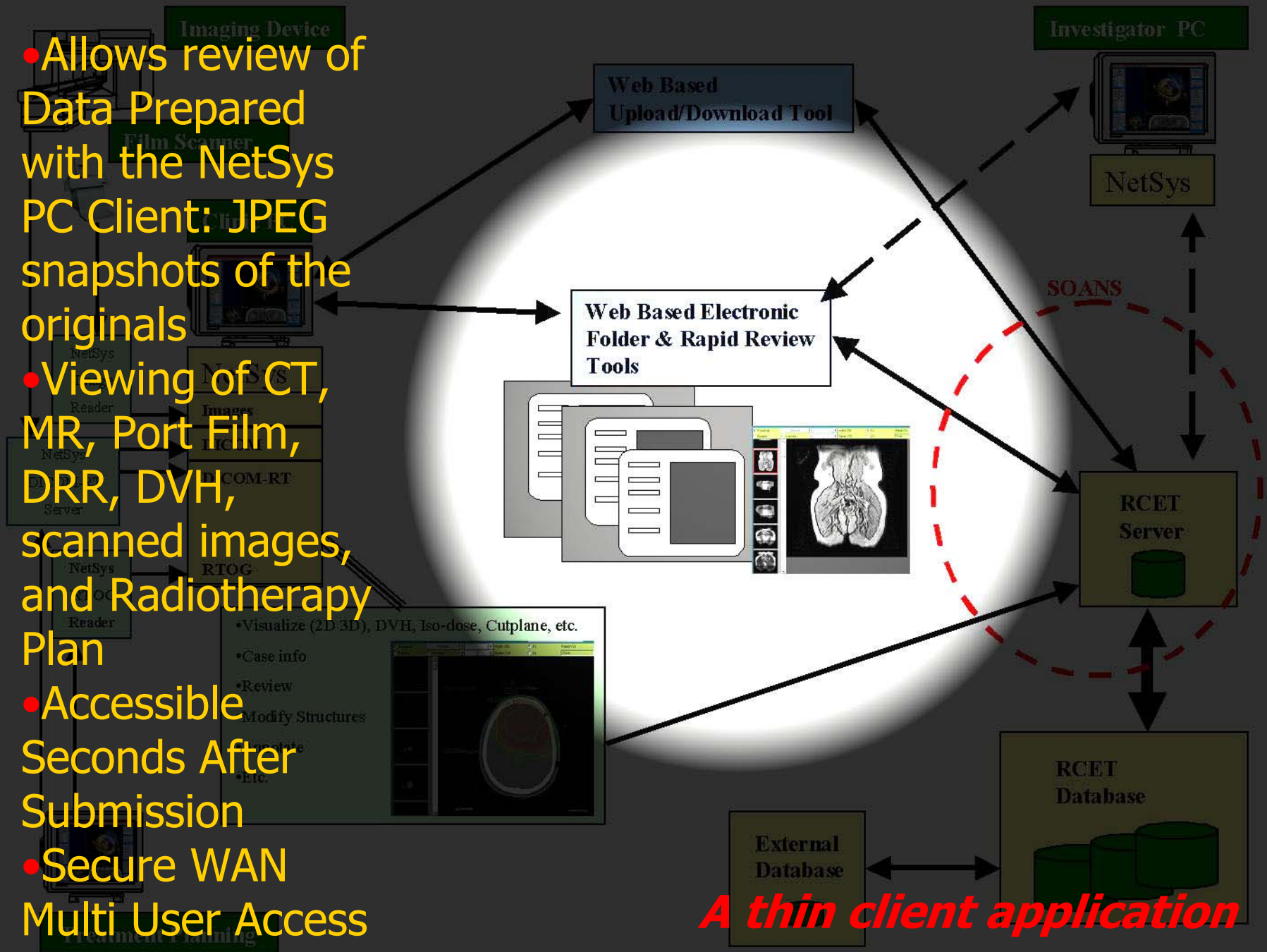


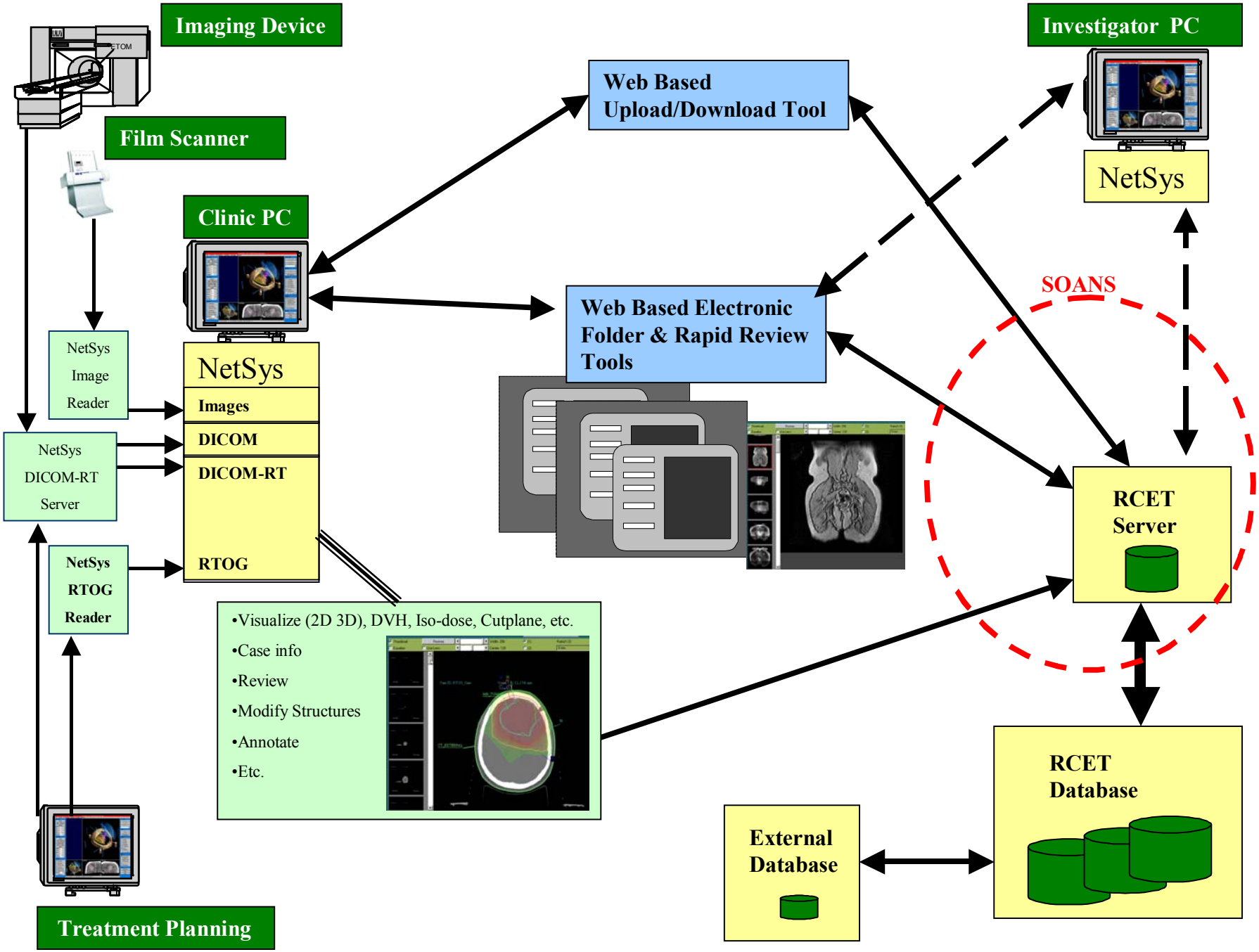


- Allows Preparation and Submission of Radiotherapy and Diagnostic Imaging Data
- DICOM Server, RTOG Server, and Image Interpreter import data and convert to internal DICOM RT format
- Performs Anonymization of Patient Data
- Views Are Set for Rapid Web Review

A thick client application

- Allows review of Data Prepared with the NetSys PC Client: JPEG snapshots of the originals
- Viewing of CT, MR, Port Film, DRR, DVH, scanned images, and Radiotherapy Plan
- Accessible Seconds After Submission
- Secure WAN Multi User Access




Imaging Device
Film Scanner
Clinic PC
Investigator PC
NetSys
Web Based Upload/Download Tool
Web Based Electronic Folder & Rapid Review Tools
SOANS
NetSys Image Reader
NetSys DICOM-RT Server
NetSys RTOG Reader
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Images
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RCET Server
•Visualize (2D 3D), DVH, Iso-dose, Cutplane, etc.
•Case info
•Review
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•Etc.
RCET Database
External Database
Treatment Planning

Electronic Folder

PI_Frame_Set - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://rcet.health.ufl.edu/UserLogin/Guest_Frame_Set.asp

Welcome: demo Access Level : Guest

User Name: Guest User Institution Name: RCET

Electronic Folder For The Case: Anonymized_P

Protocol: Test Protocol

Assigned Name (Optional): Anonymized

RX Description: Summary of the RX

Treatment Modality: External Beam X Ray

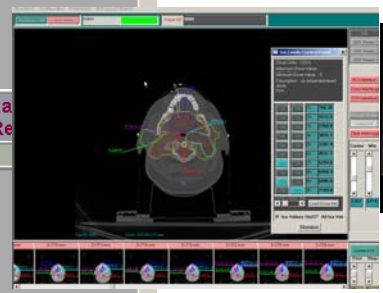
TX Course Number: 2

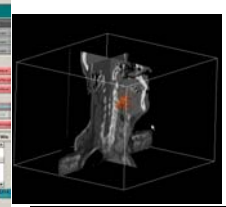
Summary of the uploaded data

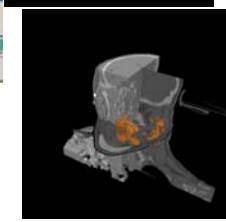
CT Images	MR Images	US Images	CR Images	Portal Images	RT Images
18	53	0	5	2	0

Summary of available AAPM Format Based RT Data Sets

Description	Date Created	Latest Date Updated	Number of Image Sets	Number of DVH Sets	Number of Data Sets	La Re
IMRT BRAIN	2/16/2001	2/19/2001	2		2	

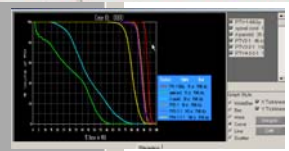






CT Modality

NumImages	Description	DateSubmitted	DateReviewed	Set_Description
2	Demo_Scanned	2/22/2001	3/26/2001	
16		2/23/2001	2/23/2001	



MR Modality

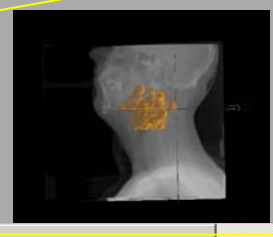
NumImages	Description	Date Submitted	Date Reviewed	Set Description
30	Sample Description	07/21/01	10/10/2001	

AAPM Format Based RT Data Sets:

Date Submitted	Date Reviewed	Description	Latest Version	Num Images
2/16/2001	2/16/2001	BRAIN IMRT Using Corvus	1	78
2/19/2001		BRAIN IMRT Using ADAC	1	78

Portal Images

NumImages	Description	DateSubmitted	DateReviewed
2	Demo_Scanned	2/22/2001	2/26/2001



RT Images

NumImages	DateSubmitted	DateReviewed	Description

Done Internet

Resource Center for Emerging Technologies (RCET) @ UF

(http://rcet.health.ufl.edu)

Summary

The RCET System is developed to support advanced technology clinical trial initiatives of the NCI under the ATC umbrella.

The RCET System is ideally suited for;

- auto-archiving and retrieval of diagnostic images, treatment planning images, and radiation therapy objects.
- Web-based rapid review
- Proactive QA

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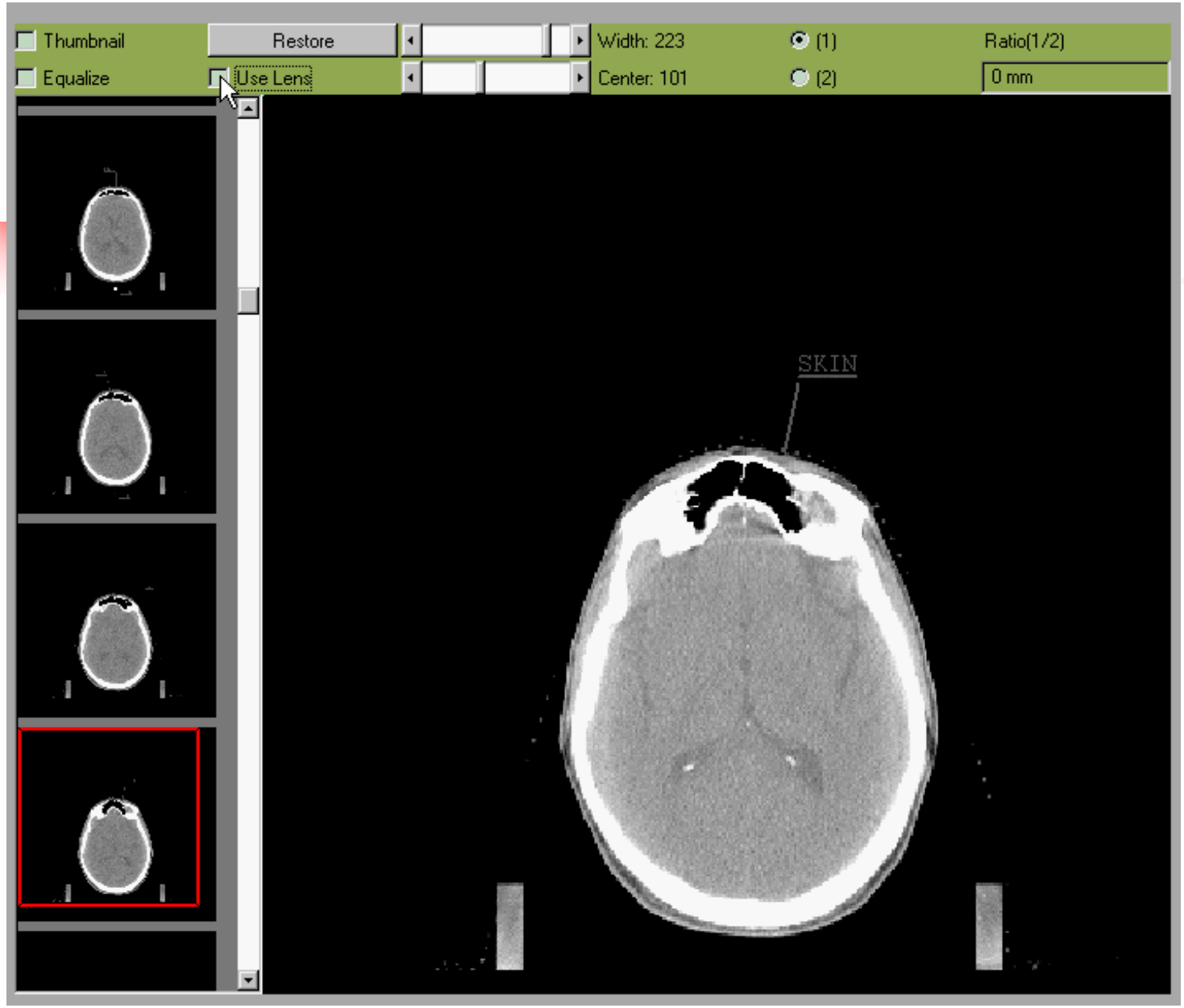

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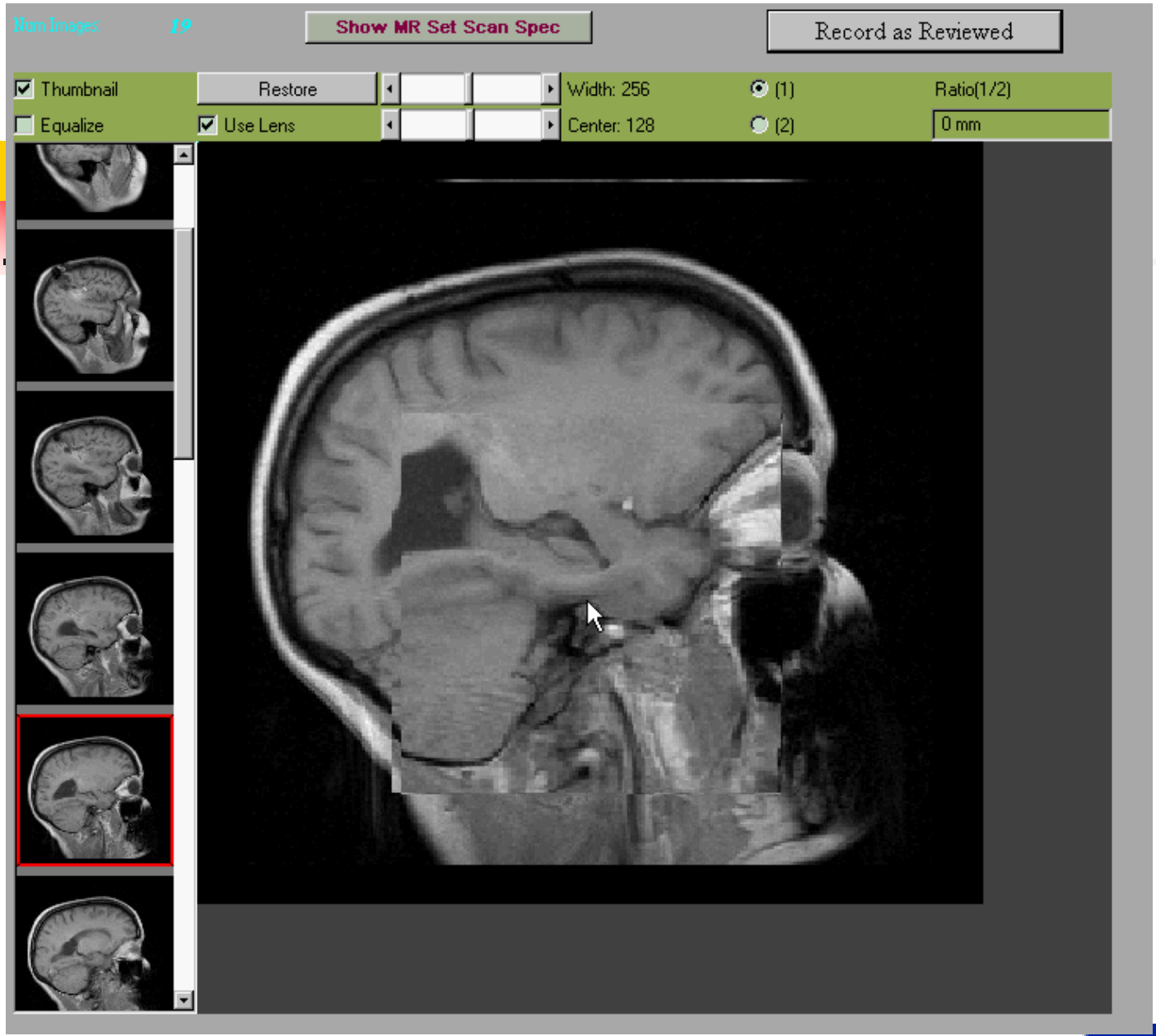

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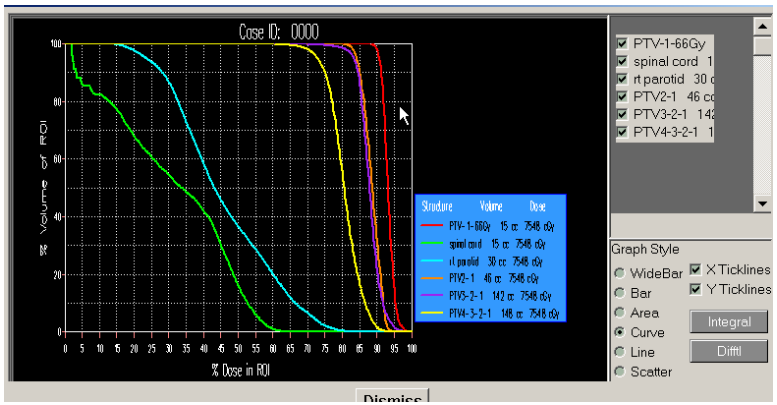

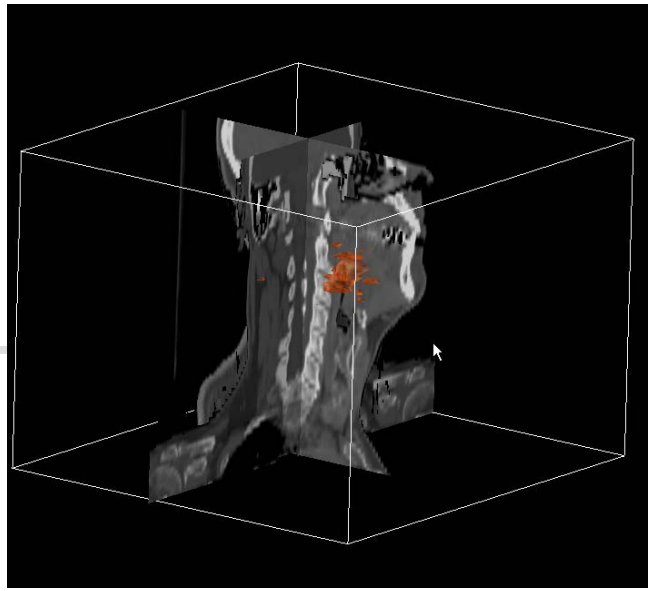

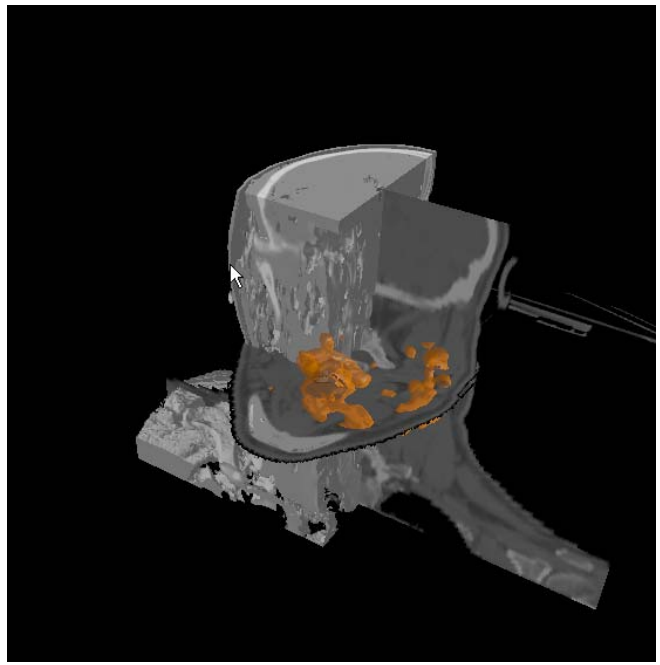

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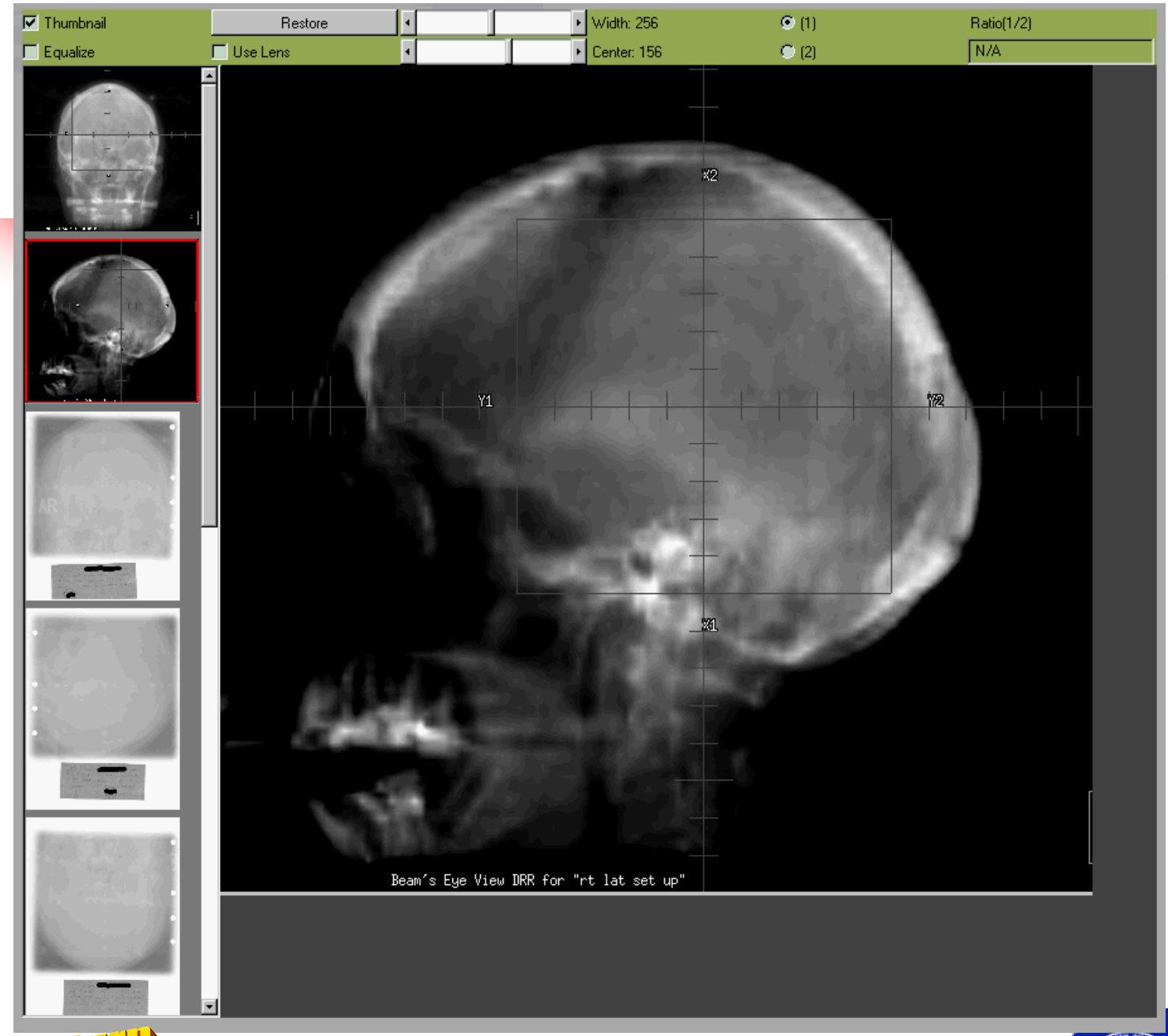

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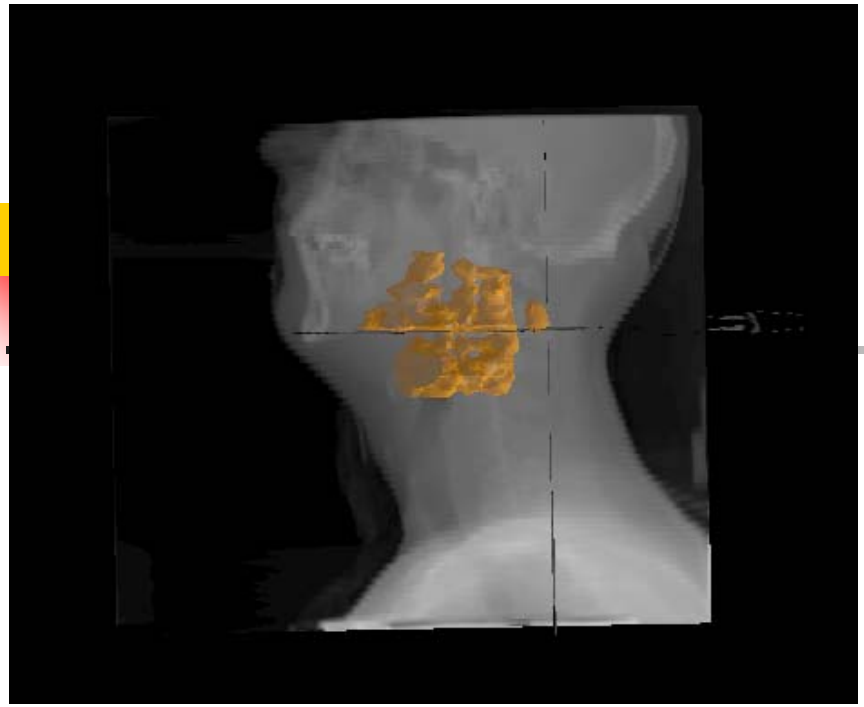

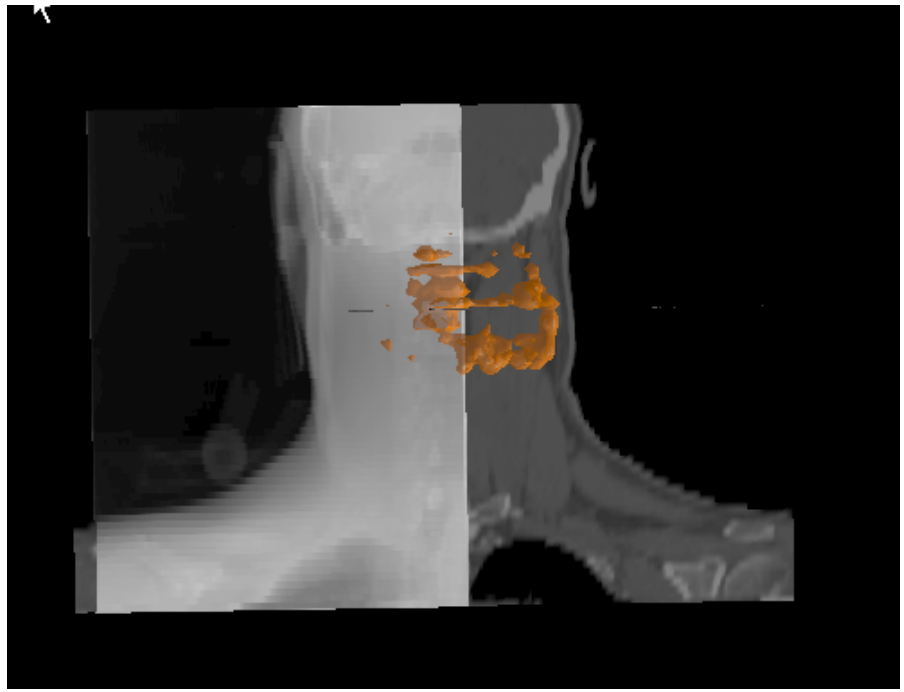

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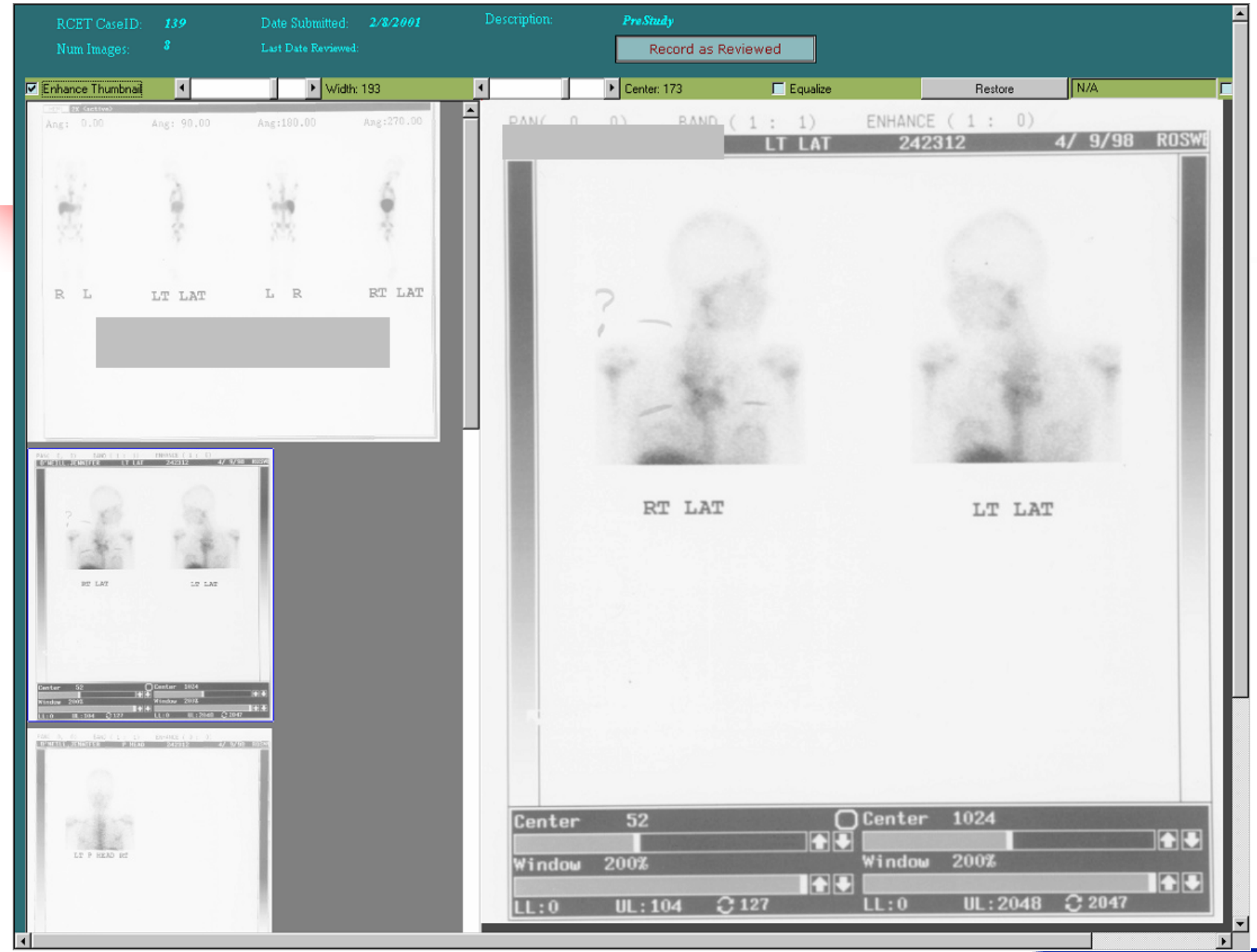

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